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S-757 - Rpt #2(Final)
Contract: QMR&E (NATICK) #133
(Agreement)
Rogers Brothers Seed Company

Study on Commercial Like Storage of Irradiated Potatoes

Period: 1 October 1959 - 30 September 1960

QUARTERMASTER FOOD AND CONTAINER INSTITUTE FOR THE ARMED FORCES
Research and Engineering Command
Quartermaster Corps, U.S. Army
Chicago, Illinois

CONTRACT RESEARCH PROJECT REPORT

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Study on Commercial Like Storage of Irradiated Potatoes

STUDY OF IRRADIATED POTATOES
April 30, 1960 to December 8, 1960

OMR & E (Natick) No. 133

On January 2, 1960, 120 bags of typical, Idaho grown, Russet Burbank Potatoes were selected for this experiment. A sample of 60 randomly selected bags were irradiated at the MTR with 7.5×10^3 rads during the week of January 6.

Following irradiation, each bag of potatoes was numbered, tagged and weighed. The non-irradiated potatoes were similarly idendified and the two groups were placed in storage. A typical commercial storage cellar)dirt floor, straw insulated roof) was used for 45 bags of each lot. The remaining 15 bags of each lot were placed directly into refrigerated cold storage at 35° F. On April 18 the control potatoes were removed from thecellar and placed in refrigerated storage. The irradiated potatoes were removed from the cellar and placed in cold storage on April 28.

T The observations made prior to April 30, 1960 concerning weight loss, wet rot, sprouting have been reported in--"Study of Irradiated Potatoes"--January 1 to April 30, 1960.

The average weight loss was again determined in June and October. The resulsts are shown in Table 1. Results based on limited observations indicated by an asterick.

Table 1
Weight Loss

Sample	Weight loss by June	Weight loss by October
Irradiated, cellar cold storage	5.64%	12.33%
Irradiated, cold storage	4.97%	11.33%
Control, cold storage	5.38%	--
Control, cellar, cold storage	3.65*	8.64%

As can be readily seen from the above data, the weight loss of the lots was about the same for the six months of storage. Thereafter the weight loss in the irradiated potatoes was greater than in the non-irradiated potatoes.

In June the cooking quality of the raw potatoes was investigated. The potatoes were cooked in steam and graded as to color and flavor. The observations are tabulated in Table II.

Table II
Cooking Quality

Sample	Color	Flavor
Irradiated, cellar cold storage	Very grey	Slight green flavor
Irradiated, cold storage	Very grey	Good
Control, cellar cold storage	Light yellow	Very good
Control, cold storage	Light yellow	Very Good

The above observations, as contrasted with the results of cooking tests previously reported which showed no difference between the lots, indicates that the non-irradiated potates are more resistent to dicoloration upon prolonged storage than irradiated potatoes.

In June, samples of each lot were made into standard potato flakes, reconstituted and evaluated for texture, flavor and color. The results are shown in Table III.

Table III
Evaluation of Standard Flakes

Samples	Texture	Flavor	Color (Agtron reference 5052.5-5067)
Irradiated, cold storage	A	Very Good	9.0
Irradiated, cellar, cold storage	A	Very Good	15.00
Control, cold storage	A	Very Good	37.00
Control, cellar cold storage	AA	Very Good	38.00

As a check, additional samples of each lot were made into potato flakes in July.

The results are shown on Table IV. The Agtron readings were made using Standards 5048.5 and 5060. Standard Production potato flakes normally produce a reading of about 20 using these standards.

Table IV
Color Evaluation of Flake With Additive

Sample	Texture	Flavor	Color (Agtron Re: 5048.5-5060)
Irradiated, cold storage	A	Very Good	4
Irradiated, cellar cold storage	A	Very Good	2
Control, cold storage	A	Very Good	12
Control, cellar, cold storage	A	Very Good	24

As indicated by the above results the non-irradiated potatoes consistently produce whiter or lighter color products than the irradiated potatoes. On the other hand, the results do not show a great difference in either texture or flavor.

In July, samples of each lot were processed into a standard dehydrated dice. The appearance of the dried products and the reconstituted material is shown in Table V.

Table V

Sample	Dried Product	Reconstituted Product	Color Agtron Re: 5040-5052.5	Reconstitution
Irradiated, cellar cold storage	Grey	Grey	20	1:4.27
Irradiated, cold storage	Grey	Grey	6	1:4.14
Control, cold storage	Yellow	$1. Grey	61	1:4.15
Control, cellar cold storage	Yellow	Yellow	34	1:4.40

In December the reducing sugar content of samples from each lot was determined. The results are shown in Table VI.

Table VI
Reducing Sugar Content

Sample	Average Specific Gravity	Average Percent Solid	Average Percent Sugar
Irradiated, cellar cold storage	1.096	23.4	2.3
Irradiated, cold storage	1.101	24.3	2.3
Control, cold storage	1.101[x]	24.5[x]	2.7[x]
Control, cellar cold storage	1.111[+] 1.095[o]	26.6[+] 23[o]	2.6 2.5[o]

x One sample only
+ One very high sample in lot.
o Omitting the one very high sample from calculation

In summary, the experimental observations made during the storage period indicate that the irradiated potatoes were more resistant to wet rot and sprouting than the non-irradiated potatoes. They appeared however to have far less resistance to discoloration. In other respects no significant differences were observed.